White Paper

ANDREW
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Smart Bias Tees, Configurations and Practical Usage

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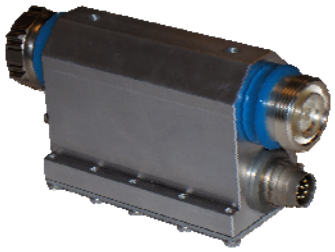
In order to communicate with AISG devices on the top of a tower with a controller located at the bottom of the tower, there must be a communication link between the two locations. The simplest way of doing this is with a long AISG cable installed from the controller location at the base of the tower to the Antenna Line Device (ALD) at the top of the tower. This is referred to as a 'Home Run Cable' configuration. Multiple devices can be daisy-chained together so that only a single home run cable is required per sector or even per site.

However, a home run cable may not always be an option due to different tower constraints and configurations. In these cases, a pair of smart bias tees (SBTs) can be installed on the feeder cable to replace the home run cable. Especially with the advent of AISG compliant tower mounted amplifiers (TMAs) that have built-in SBTs, this may be a desirable option. The SBT (Figure 1) modulates the AISG signal onto a 2 MHz carrier and injects it onto the coaxial cable line.

Figure 1. Two examples of Andrew Teletilt® Smart Bias Tees (SBTs).



ATBT-S Series

ATBT Series

Another option to consider when selecting SBTs is the AISG bus voltage. If you are installing a system with a 24 Vdc bus voltage, then a 24 Vdc AISG compliant SBT must be used. Likewise, if you are installing a system with a 12 Vdc bus voltage, then a 12 Vdc AISG compliant SBT must be used. *(Note: Mixing devices meant for different bus voltages will cause the wrong voltages to appear on pins in the AISG cable and may cause equipment damage.)*

As mentioned above, there are two overall 'simple' configurations for SBTs: (1) one is using a SBT at the bottom of the feeder with another SBT at the top of the feeder; (2) the other 'simple' configuration is using a SBT at the bottom of the feeder and an AISG compliant TMA at the top.

Figure 2 shows an example of the SBT Configuration that uses a SBT at both the bottom and the top of the feeder. In this scenario, the bottom SBT unit is placed at the bottom of the tower and the top SBT unit is placed at the top of the tower with both most likely connected directly on the end of one of the feeder lines to help eliminate losses due to unnecessary connections. In both the top and bottom SBTs, the gender for both RF connector ports on each SBT will need to match the orientation needed. In order to be AISG compliant, the bottom SBT must be equipped with a male AISG connector and the top SBT will need a female AISG connector. A standard AISG cable will connect the bottom SBT unit to the controller and the top SBT to the first antenna line device (ALD), either directly, or through a junction box.

Figure 2. SBT Configuration Using SBTs At Both Top And Bottom Of Tower.

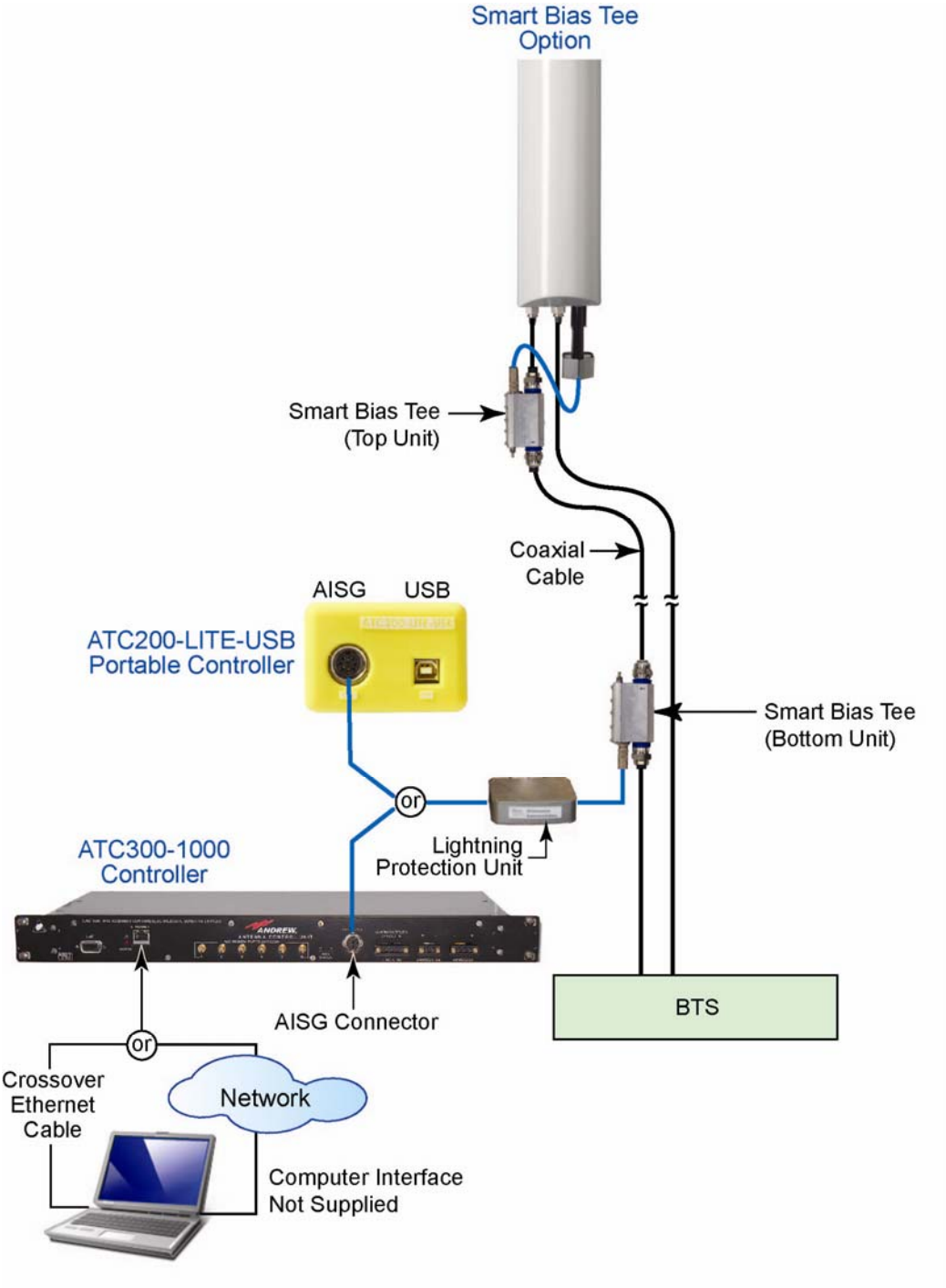
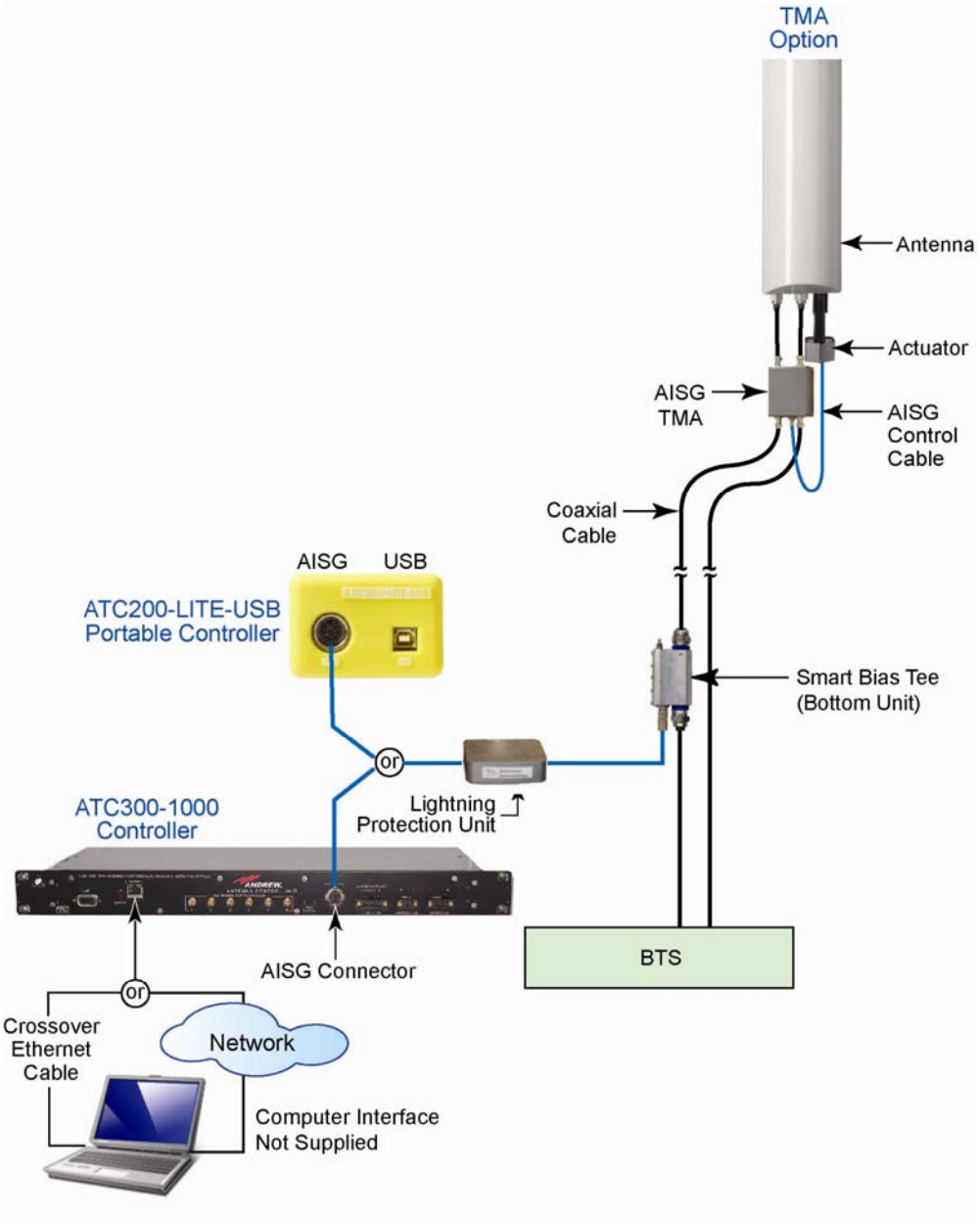


Figure 3 illustrates the simple configuration that uses a SBT at the bottom of one of the feeders and a TMA placed at the top of the same feeder on the tower. The gender for the RF connector ports on the SBT will need to match the orientation needed. In order to be AISG compliant, the bottom SBT must be equipped with a male AISG connector. The AISG TMA is equipped with a built-in SBT and a female AISG connector. A standard AISG cable will connect the bottom SBT unit to the controller and the TMA to the next ALD (the TMA is the first ALD in this scenario).

Figure 3. SBT Configuration Using TMA At Top Of Tower.



(Note: The internal wiring of the AISG devices is done so that the ALDs are in parallel, even though the devices may be cabled in a serial fashion, so that it does not matter which device is the 'first' device in the chain, and the 'first' device in the chain may not show up as the 'first' device in a scan.)

More Elaborate Configurations

The configurations described above (refer to Figures 2 and 3) are the simplest form of smart bias tee usage, which most likely won't be used by themselves, but instead combined into multiple run or daisy-chained ALDs.

In addition to these two 'simple' configurations there are other configurations that are possible. Andrew offers a variety of Smart Bias Tee options to fit your every need. Please contact your local Andrew representative for current model offerings.

Full Site Home-Run Cable

Figure 4 provides an example diagram of a full site that has been configured with a home run cable connecting the controller (ATC300-1000) and the first ALD (the far right antenna in the diagram). Notice the antennas have been daisy chained together across sectors.

Figure 4. Three Sector Site Configured With A Home Run Cable.

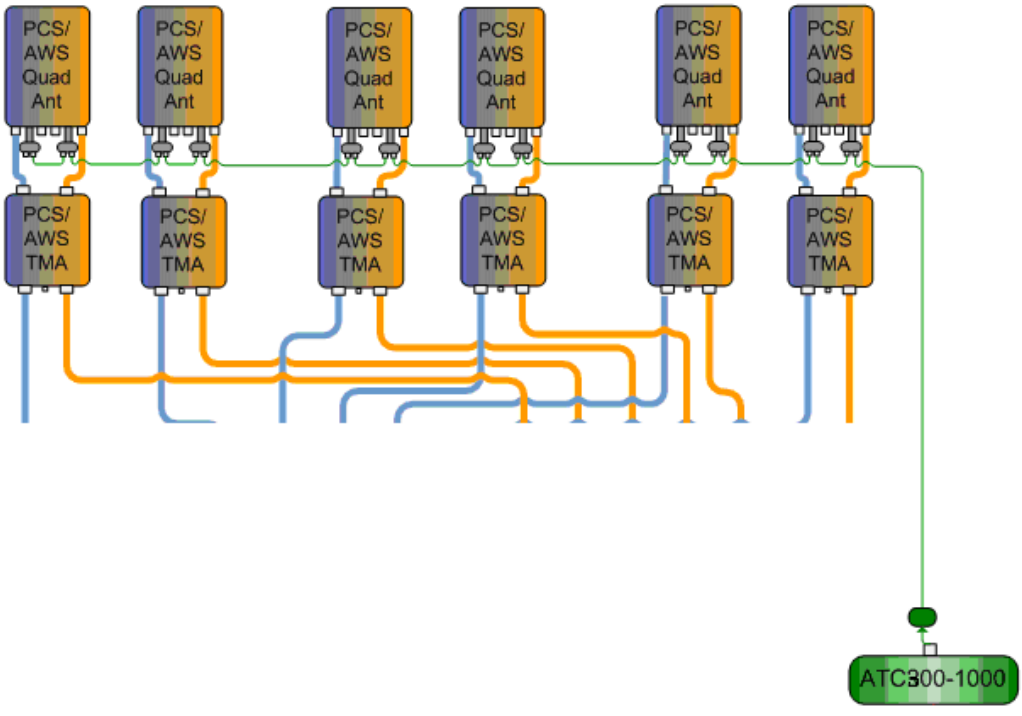
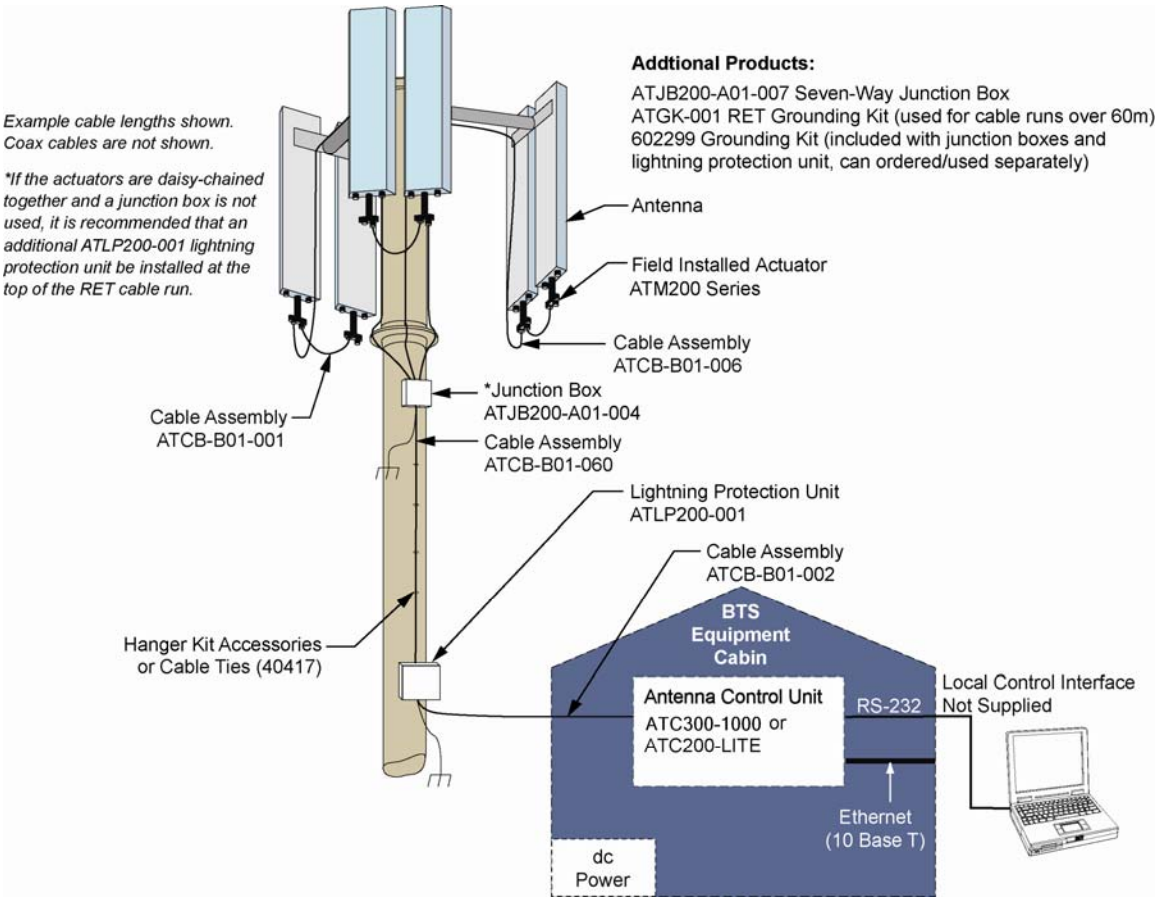


Figure 5 offers another possible configuration that uses a home run cable with a junction or splitter box to split the AISG cable out to each sector. Note the other components available from Andrew that help complete a full Teletilt® system.

Figure 5. Three Sector Site Configured With A Home Run Cable And A Junction Box.



Full Site SBT Configurations

Figure 6 shows a possible scenario of a full three sector site configuration using SBTs and TMAs. The TMAs get their dc power from the controller via the SBTs and coax. They then pass the dc power on to the actuators on the antennas via the AISG control cable. Notice that all the antennas in one sector are connected and controlled by one SBT. A junction box is used to connect the AISG data cables to the SBTs and the controller.

Figure 6. Three Sector Site Using SBTs And AISG TMAs.

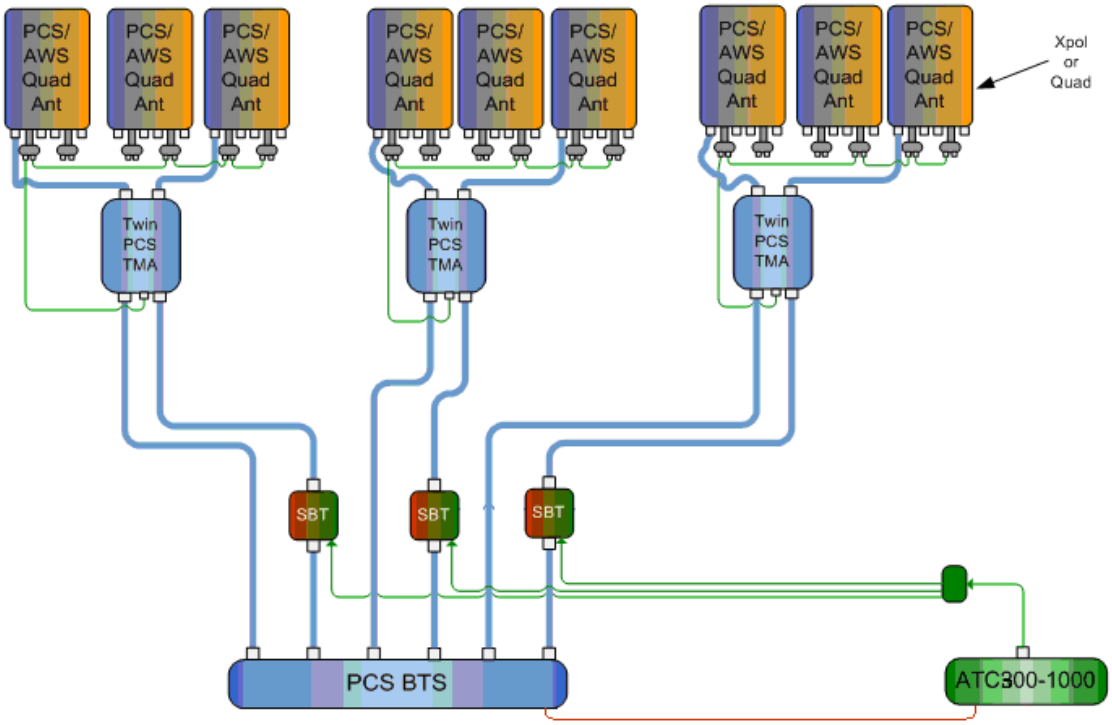


Figure 7 gives us another possible configuration utilizing some legacy equipment in conjunction with SBTs and AISG compliant TMAs. Notice that all the antennas in one sector are connected and controlled by one SBT. A junction box is used to connect the AISG data cables to the SBTs and the controller.

Figure 7. Full Site Configuration With Legacy Equipment.